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Monash Biomedicine Discovery Institute
Neuroscience Program

OTHER PROGRAM AFFILIATIONS



Development and
Stem Cells



Metabolism, Diabetes
and Obesity

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Work in our laboratory has contributed extensively to the field of neuroendocrinology and currently have 3 main divisions:

- Reproduction: effects of gut peptides on the brain; role of kisspeptin and gonadotropin inhibitory hormone on reproductive function; vaccination in early life for life-long sterility.
- Metabolic neuroendocrinology: predisposition to obesity; relationship between stress and metabolic function.
- Heat stress: effects on body tissues, gut and brain function.

We utilise sheep models, which allow a range of studies not easily undertaken in small laboratory species. We have developed a number of novel neuroendocrine methodologies that allow analysis ranging from the whole animal down to the single cell and subcellular function. These techniques facilitate national and international collaborations, with grant funding from Australian and offshore sources. In addition, our laboratory undertakes a range of contract research projects.

Research Projects

Research in the Neuroendocrinology Lab currently focuses on the following areas:

1. **Central regulation of reproduction by kisspeptin and gonadotropin inhibitory hormone**
2. **Estrogen signalling in neuroendocrine systems**
3. **Control of food intake and energy expenditure by leptin and novel regulatory factors**
4. **Optogenetic control of kisspeptin function**
5. **Neonatal sterility vaccination, using a novel approach**
6. **Heat stress in various genetic models**

Selected significant publications:

1. George JT, Hendrikse M, Veldhuis JD, **Clarke IJ**, Anderson RA, Millar RP. 2017. Inhibitory effect of gonadotropin inhibitory hormone (GnIH) on luteinizing hormone secretion in man. *Clinical Endocrinology*, 86:731-738.
2. Allen-Worthington K, Xie J, Brown JL, Edmunson AM, Dowling A, Navratil AM, Scavelli K, Yoon H, Kim D-G, Bynoe MS, **Clarke IJ** and Roberson MS. 2016. The FOF1 ATP synthase complex co-localizes with the GnRH receptor in membrane rafts in gonadotrope cells. *Molecular Endocrinology* 30:996-1011.
3. Ezzat A, Pereira A, **Clarke IJ**. 2015. Kisspeptin is a component of the pulse generator for GnRH secretion in female sheep but not the pulse generator. *Endocrinology* 156:1828-37.
4. Hewagalamulage S, **Clarke IJ**, Young IR, Rao A and Henry BA. 2015. High cortisol response to adrenocorticotrophic hormone (ACTH) identifies ewes with reduced melanocortin signalling and increased propensity to obesity. *Journal of Neuroendocrinology* 27:44-56.
5. Henry BA, Andrews Z, Rao A, **Clarke IJ**. 2011. Central leptin activates mitochondrial function and increases heat production in skeletal muscle. *Endocrinology* 152: 2609-2618